THE AMERICAN OIL CHEMISTS' SOCIETY

JOURNAL OF OIL & FAT INDUSTRIES

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Journal of Oil and Fat Industries

Devoted to Oils, Fats and Allied Industries

VOL. II OCTOBER, 1925 No. 4

EDITORIALS

With this number the *Journal of Oil and Fat Industries* as a Quarterly ceases to exist, to become shortly a monthly magazine published by Miller Freeman of New York, San Francisco and Seattle.

Our President has requested that the following statement made by Mr. Cluff be incorporated in an editorial for this issue: "The publication of the JOURNAL by our Society will cease with the October issue, but the publication will be continued under the same name by the Miller Freeman Company of New York, with the coöperation of this Society, and all members of the Society in good standing will continue to receive the JOURNAL as published by the Miller Freeman Co., without any increase in dues."

To Messrs. Cluff and Morrison the Society is indebted for this arrangement which will give the members a monthly magazine, without any of the responsibility for its financing. Mr. Morrison says farther of the agreement between the A. O. C. S. and Mr. Freeman that, "While they are standing all the expense and receiving any benefit there might be in advertising, etc., we will have very considerable control over the character of the papers to be printed. These are to be submitted to a committee of our Society for review."

Further than this your present editor has no knowledge of the arrangements which have been consummated but doubtless the first number of the new periodical will bear the names of its editorial staff and the Society's committee who will review all papers before their publication.

It is confidently expected that the new venture will both add to the prestige of the Society and gratify its members by giving them at more frequent intervals, a larger, better publication. As Mr. Morrison has said, "It was better to try to build up a strong magazine in some other manner than have a weakling such as, I feel, our magazine would have been had we attempted to carry out our original idea under the circumstances as they have developed."

Bon Voyage

The writing of a final editorial is almost as difficult as the penning of an obituary for one's own child. If, however, one has a real faith in the glories of the future neither need be heart breaking. The *Journal of Oil and Fat Industries* is not to die but merely pass on into a realm of bigger and brighter days. Yet those of us who have not only seen its birth, and watched those first tottering steps out into the great wide world, but planned for its coming months before it was born, cannot help but feel a sadness in seeing it grow out of our care.

There comes in time to him who builds any business, a feeling toward it not unlike that of human kinship and to the editors and publishers of a journal this is almost that of fatherhood. One comes to look upon the printed page that issues from the press as he would upon the babe for whose birth there had been weeks of loving preparation. When, then, there is no more watching, planning, hoping and fearing for the welfare of the infant, the feeling of relief from worry and work is not unmixed with a sense of loss and loneliness.

That this is the mood of our splendid publisher is indicated by expressions in his recent letters. Mr. Mack says, "At first I was very much disappointed to think my personal efforts had gone to build a journal for some one else, but after thinking the matter over I return to my old philosophical argument that good seed properly planted will some day be harvested." And in another letter, "We have assisted in our small way, in the last twenty-five years, a number of scientific societies to build for themselves successful publications. The work and sacrifice contributed by many individuals in building these scientific journals has been an inspiration to us and we have discovered that a printer can lose nothing by throwing all his energy and thought into assisting such individuals in building these monuments to science."

To Mr. Mack, President of the Eschenbach Printing Company, the Editor wishes to make this most tardy public acknowledgment of the great debt he personally owes for continual assistance and untiring patience with one who was absolutely ignorant of all the things an Editor should know. Without Mr. Mack's assistance, and insistence, the very cover of THIS JOURNAL would never have come into being. He not only suggested the design but, when the funds of the Society would not quite stand the expense of the plate, generously donated it himself. We owe him a real debt, and one of the keenest regrets at the coming change is that, just at the time when the JOURNAL was beginning to pay him some little profit, he is losing its printing.

We have on several occasions expressed our appreciation of the untiring efforts made by Mr. Smith, our manager, in the securing of advertising. He too feels disappointed that we cannot carry on a little longer until the

advertising will pay a larger part of the expense of printing than now because of our small circulation. The paltry return which Mr. Smith has received as his percentage of the net revenue of advertising would hardly have looked good to a printer's devil. He, as Mr. Mack, must take his pay now, not in prospective profits, but the satisfaction of a hard job well done.

To the Editorial Staff and especially Miss MacDonald, the Editor is deeply grateful for help, often when it was most sadly needed and always generously and freely given.

And so we, as a little family, your servants for a brief while, bid you adieu and wish you God-speed in your larger venture. The opportunity is still yours to make the *Journal of Oil and Fat Industries* a publication which will rank with the other journals of American Scientific Societies throughout the world. It may be a bit harder to fill a monthly with all high-grade articles by men such as Dr. C. A. Browne, Geo. S. Jamieson, Arthur Holmes, Glen Pickard, Dr. Wesson and others who have been our contributors in the past but it can be done if the whole Society is heartily behind their Official Organ.

ADDITIONAL COMMITTEE APPOINTMENTS

There were some committees mentioned in the July JOURNAL whose personnel was not complete at that time. All appointments have now been made as follows:

SEED COMMITTEE:

D. C. Picard, *Chairman*
G. R. Dunning, C. H. Cox, A. W. Putland, W. D. Hutchins.

UNIFORM METHODS COMMITTEE:

F. B. Porter, *Chairman*
Archibald Campbell, D. C. Picard, P. S. Tilson, W. D. Richardson.

SUB-COMMITTEE ON THE DETERMINATION OF THE DETERGENCY OF SOAP PRODUCTS:

L. F. Hoyt, *Chairman*
R. K. Brodie, Percy H. Walker, H. S. Mitchell, M. H. Ittner, E. T. Marceau, John S. Boulden.

ORIGINAL CONTRIBUTIONS

THE CHEMICAL COMPOSITION OF THE BITONTO TYPE OF ITALIAN OLIVE OIL

By Walter F. Baughman and George S. Jamieson

An investigation of the composition of olive oil expressed from Mission olives grown in California has already been reported.[1] Since then the composition of the Bitonto type Italian olive oil has been determined in order to compare the compositions of two samples of oil expressed from different types of olives grown in two widely separated parts of the world.

Chemical and Physical Characteristics.—The more important chemical and physical characteristics of the Italian oil are recorded in Table 1. The results for the California oil are also given and a comparison shows that the differences are small. The most important differences are in the percentages of saturated and unsaturated acids. The Italian oil contains 2% more saturated acid and a correspondingly smaller percentage of unsaturated acid than the California oil.

Table 1

	Italian oil	California oil
Specific gravity 25/25°	0.9120	0.9119
Refractive index 20°	1.4690	1.4690
Acid value	1.8	1.5
Iodine number (Hanus)	84.4	85.1
Saponification value	190.8	190.6
Unsaponifiable matter (per cent)	1.1	1.0
Acetyl value	7.0	11.2
Saturated acids (determined) iodine no. 7.9 (per cent)	11.9	....
Unsaturated acids plus unsaponifiable matter (determined) (per cent)	83.4	....
Iodine number of unsaturated acids	94.2	....
Saturated acids (corrected) (per cent)	10.9	8.9
Unsaturated acids (corrected) (per cent)	83.3	85.2

Unsaturated Acids.—The iodine number of the unsaturated acids fraction was 94.2 which indicated that this fraction consisted of oleic acid (iodine number 90.1) and linolic acid (iodine number 181.4). Using these data the following percentages were calculated:

	%	In original oil %	Glycerides in original oil %
Oleic acid	95.51	79.56	83.1
Linolic acid	4.49	3.74	3.9
	100.00	83.30	87.0

[1] This Journal, **2**, 40 (1925).

Saturated Acids.—The methyl esters of the saturated acids were prepared and fractionally distilled under diminished pressure as described in the article on California olive oil. The fractions were analyzed and their compositions calculated from the analytical data as described in the previous article. The following percentages of saturated acids were found to be present:

	%	In original oil %	Glycerides in original oil %
Myristic acid	0.04	trace	trace
Palmitic acid	80.87	8.81	9.2
Stearic acid	17.28	1.88	2.0
Arachidic acid	1.81	0.20	0.2
	100.00	10.89	11.4

Arachidic, stearic and palmitic acids were isolated from various fractions by crystallization from alcohol and their identity established by the melting points and by observing whether or not these melting points were lowered when the substances were mixed with equal amounts of the respective acids which they were suspected of being and the purity of which had been established previously by elementary analysis. It was not possible to isolate pure myristic acid but a small crop of crystals was obtained which melted at 57–58°C. It is believed that this crop consisted of a mixture of myristic acid (m. p. 54°C.) and palmitic acid (m. p. 63°C.).

Summary

The chemical composition of Bitonto type of Italian olive oil has been determined and is given below. For comparison the composition of California olive oil expressed from Mission olives is also given:

		Italian olive oil Bitonto type	California olive oil from Mission olives
Glycerides of	Oleic	83.1	84.4
	Linolic	3.9	4.6
	Myristic	trace	trace
	Palmitic	9.2	6.9
	Stearic	2.0	2.3
	Arachidic	0.2	0.1
Unsaponifiable matter		1.1	1.0

It will be observed that the Italian oil contains 2.1% more of the saturated acid glycerides than the California oil. The widest difference is in the percentages of palmitic acid glycerides. The California oil contains 2% more of the unsaturated acid glycerides.

CONTRIBUTION FROM THE OIL, FAT AND WAX LABORATORY,
BUREAU OF CHEMISTRY,
U. S. DEPARTMENT OF AGRICULTURE

COLOR CHANGES IN OLIVE OIL

By C. K. McWilliams

It is generally believed that the color of olive oil, which varies from yellow to green, depends principally on the characteristics of the olive and the method of production. It may not, however, be so well known that the color of the refined oil can change, depending on the composition of the oil and method of packing.

Recently this laboratory was called upon to investigate a rather unusual color change experienced by a local canner who had packed California olive oil in tin cans. At the time of packing, it was of a golden yellow color, but on opening some months later was found to have changed to a bright green. While this investigation was made primarily from a practical viewpoint of overcoming the objectionable color change, without any attempt to study the chemistry of the coloring matters involved, nevertheless, certain features of a technical nature were brought out that should prove of interest from a scientific as well as a practical standpoint.

The color of commercial olive oils appearing on the market varies from yellow through greenish yellow to green and is sometimes almost colorless. As is well known, the natural or original color of the oil at the time of production depends on a number of factors, such as the variety of olive, climatic and soil conditions under which it is grown, ripeness of the fruit, method of pressing and refining, etc. Generally the fruit is gathered just before the period of maturity which produces an oil of superior quality to that expressed from the ripe or over-ripe fruit.

In the commercial production of olive oil, the olive is generally given two or three pressings, the first pressing producing the best edible grades. After the first pressing the pulp is taken out of the press, mixed with hot water and pressed once or twice more. The oils obtained by the second or third pressing are inferior in flavor and greener in color than that of the first pressing and are generally used for lubricating or soap-making purposes. The remaining pulp, which still contains considerable amounts of oil, is sometimes treated with various solvents, by which is extracted an inferior oil usually of a bright green color due to extracted chlorophyl.

In European countries the finest qualities of olive oil are said to be produced from hand-picked fruit selected with special reference to its state of ripeness and pressed without breaking the kernels. Sometimes the olives are peeled and seeded before pressing, and this produces a particularly fine oil free from the coloring and flavoring matters associated with the skin and seeds.

In California, three pressings are usually made. The color of the oil from the first pressing varies from green to yellow, depending principally on the ripeness of the fruit, the color of each successive pressing being

greener than the one before. The oil so obtained, either by pressing or extraction, is usually turbid and is refined by washing and filtering.

While all these methods of treatment, as well as the selection of the olive and its variety, affect the original color of the oil, they are not the only influencing factors. That the color of the oil may change after production, depending on the composition and conditions of packing, will be shown later.

Although this investigation was concerned primarily with the color change occurring in the California olive oil referred to above (herein designated as Brand "A"), a large number of olive oils of both foreign and domestic origin were examined for comparative purposes.

Experiments

Table No. 1 shows the examination of the California olive oil (marked "Brand A") that turned green.

TABLE 1

BRAND "A" CALIFORNIA OLIVE OIL

Sample Can No.	Color	Odor and taste	Free fatty acids (as oleic) %
	In Cans		
1	Very light green	Normal	0.22
2	Very light green	Normal	.25
3	Light green	Normal	.33
4	Light green	Normal	.43
5	Dark green	Normal	.80
6	Dark green	Normal	.98
7	Very dark green	Normal	1.10
8	Very dark green	Normal	1.22
	In Bottles		
Bottle No.			
1	Deep yellow	Normal	0.23
2	Deep yellow	Normal	.33
3	Deep yellow	Normal	.82
4	Deep yellow	Normal	1.20

Eight cans and four bottles were examined. The color of the oil in the cans varied from light to dark green, while that in the bottles was deep yellow, although the canned and bottled oil belonged to the same lot and both were yellow when packed. The odor and taste of both the canned and bottled samples were normal and no difference could be detected in this respect. There was, however, considerable difference in the free fatty acids, and it is to be noted that the depth of the green color increased directly with the fatty acid content, indicating that the formation of green color was in some way connected with the acidity.

This green oil from the tins was transferred to bottles, stoppered and allowed to stand on the table for several months, during which time the

green color gradually reverted to yellow. This color change was evidently a reversal of the other brought about by diffused sunlight. It was later found that direct sunlight caused this reversal of color to take place much more rapidly.

In order to determine what agencies had brought about the formation of green color, yellow California olive oil was treated with the different substances that might have come in contact with it while in the tin. Table 2 shows the results of these experiments.

TABLE 2

AGENCIES CAUSING COLOR CHANGE

Substances added to yellow olive oil	Color of oil after standing 10 months at room temperature	Color of oil after heating one hour at 100°C.
Flux for end seams	Yellow (no change)	Yellow (no change)
Flux for side seams	Yellow (no change)	Yellow (no change)
Glucose	Yellow (no change)	Yellow (no change)
Glycerine	Yellow (no change)	Yellow (no change)
Gelatine	Yellow (no change)	Yellow (no change)
Zinc chloride	Yellow (no change)	Yellow (no change)
Stannous chloride	Yellow (no change)	Yellow (no change)
Stannic chloride	Yellow (no change)	Yellow (no change)
Ammonium chloride	Yellow (no change)	Yellow (no change)
Hydrochloric acid	Yellow (no change)	Yellow (no change)
Ferrous chloride	Yellow (no change)	Yellow (no change)
Ferric chloride	Yellow (no change)	Yellow (no change)
Tin plate	Changed to green	Changed to green
Metallic tin (C.P.)	Changed to green	Changed to green
Metallic iron (C.P.)	Changed to green	Changed to green

For these tests, "Brand A" California olive oil from bottle No. 3 was selected because it had an average acid content. Small amounts of this oil, placed in bottles, were treated with the two fluxes used in sealing the cans, as well as separately with the ingredients composing these fluxes. Iron and tin chlorides were also tried, as these substances might be formed by action of hydrochloric acid of the flux on the metal. Tinplate itself and the two metals, iron and tin which compose tinplate, were also placed in the yellow oil. Two series of these tests were made, one of which was allowed to stand at room temperature for 10 months and the other heated for one hour at 100°C. Fortunately, those standing for 10 months were put away in a closet and protected from light as it was later found that absence of light is necessary for the formation of green color at ordinary temperatures. It is to be noted that no change occurred with either flux or with any of the substances contained in the fluxes, but only with the tinplate or chemically pure metals composing the plate. These experiments indicate that the formation of green color has been brought about by the combined action of the free fatty acids and metal of the tinplate,

presumably a reaction of the free fatty acids on the metal whereby the yellow color of the oil is reduced to green.

In order to demonstrate the effect of the acid concentration of the oil on the color change, oils of various known acidity were next treated with tinplate. For this purpose "Brand A" California olive oil from bottle No. 3 was again used. This oil was refined by the usual alkali treatment for removing free fatty acids from vegetable oils. The residual acidity of the refined oil was 0.02% oleic acid and the oil was of a deep yellow color. A portion of this refined oil was also bleached with charcoal and fuller's earth in the usual manner, by which the color was reduced to a very light yellow. The acidity was not altered by bleaching. To these two neutral oils (yellow and bleached) were added known amounts of pure fatty acids prepared from the bleached olive oil, giving a series of oils of known acidities, ranging from 0.02% up to 2%. These oils were then placed in contact with tinplate and allowed to stand at room temperature for 10 months. The results of these tests are shown in Table 3.

TABLE 3

EFFECT OF FREE FATTY ACIDS AND TINPLATE ON YELLOW OLIVE OIL

Acidity of oil (as oleic acid) %	Color change in oil originally deep yellow	Color change in oil originally light yellow
0.02	Deep yellow (no change)	Light yellow (no change)
0.10	Changed to very light green	Changed to greenish yellow
0.25	Changed to light green	Changed to greenish yellow
0.50	Changed to green	Changed to greenish yellow
1.00	Changed to dark green	Changed to greenish yellow
2.00	Changed to very dark green	Changed to greenish yellow

As indicated in the table, no change in color took place with the practically neutral oil (0.02% acidity) while the remaining oils containing free fatty acids changed to green and the depth of this green color increased directly with the acid content. In the case of the bleached oil, however, only a very slight greenish yellow developed, due to the fact that the original yellow color of the oil had been removed by bleaching. From these experiments, it is very evident that the formation of green color depends on two factors: (1) free fatty acids, (2) depth of original yellow color of the oil.

In contact with metal the fatty acids presumably react with the former, reducing the yellow color to green. If, however, the original yellow coloring matter is not present, or only present in small amount, little or no formation of green color can take place.

For the purpose of confirming these findings and to ascertain whether these color changes were peculiar to California olive oil or common to olive oils in general, a considerable number of other brands of California, as well as foreign, olive oils were examined. These olive oils include

French and Italian products packed in both cans and bottles. In all cases the same brand of oil in both bottles and cans were examined, if obtainable. Table 4 shows the results of examination of several varieties of domestic and foreign oils packed in bottles.

TABLE 4

COLOR AND COLOR CHANGES OF VARIOUS BRANDS OF BOTTLED OLIVE OIL

Brand	Source	Free fatty acids as oleic acid %	Original color as recd.	Color after contact with tinplate			
				Heated at 212°F. in light	Heated at 212°F. in dark	Standing cold in light	Standing cold in dark
A	Calif.	0.33	Deep yellow	Light green	Light green	Deep yellow	Light green
A	Calif.	.80	Deep yellow	Dark green	Dark green	Deep yellow	Dark green
B	Calif.	.82	Deep yellow	Dark green	Dark green	Deep yellow	Dark green
C	Calif.	.61	Deep yellow	Medium green	Medium green	Deep yellow	Medium green
D	Calif.	1.30	Deep yellow	Dark green	Dark green	Deep yellow	Dark green
E	Calif.	2.21	Deep yellow	Dark green	Dark green	Deep yellow	Dark green
F	Calif.	0.60	Medium yellow	Medium green	Medium green	Medium yellow	Medium green
G	Calif.	2.40	Medium yellow	Medium green	Medium green	Medium yellow	Medium green
H	France	0.69	Medium yellow	Medium green	Medium green	Medium yellow	Medium green
I	France	.85	Medium yellow	Medium green	Medium green	Medium yellow	Medium green
J	France	.83	Light yellow	Light green	Light green	Light yellow	Light green
K	France	1.76	Light yellow	Light green	Light green	Light yellow	Light green

It is especially noteworthy that all of these oils, as received, were yellow in color, varying from light to deep yellow, and with considerable variation of free fatty acids among different brands. These samples were divided into four portions and placed in contact with tinplate. Two portions were allowed to remain for 10 months at room temperature (one in the light and one in the dark) and the other two portions heated one hour (one in the light and the other in the dark) at 212°F. Practically the same change took place in every case whether heated or cold, the only difference being that heat accelerated the reaction. In the case of the heated oil, light or darkness had no effect on the color change because of the rapidity of the reaction due to increased temperature. With the samples standing in the cold, however, the one in the light did not change, because of the reversible reaction due to light, preventing the formation of green color. In the

dark, a green color formed in from 2 to 10 months. In every case it was found that in a general way the depth or strength of green color depended on the depth of the original yellow color and the acidity of the oil, that is, a deep yellow oil high in fatty acids gave a deep or dark green color, while one either light yellow or low in acids gave a lighter green.

Table 5 shows the examination of various brands of foreign and domestic oils packed in tin.

TABLE 5

COLOR AND COLOR CHANGES OF VARIOUS BRANDS OF CANNED OLIVE OIL

Brand	Source	Free fatty acids as oleic acid %	Original color as recd.	Color after transferring to glass			
				Standing cold in light	Standing cold in dark	Standing cold with tin in light	Standing cold with tin in dark
A	Calif.	1.10	Dark green	Deep yellow	Dark green	Deep yellow	Dark green
A	Calif.	0.22	Light green	Deep yellow	Light green	Deep yellow	Light green
B	Calif.	1.27	Dark green	Deep yellow	Dark green	Deep yellow	Dark green
C	Calif.	0.70	Medium green	Deep yellow	Medium green	Deep yellow	Medium green
L	Italy	.56	Medium green	Light yellow	Medium green	Light yellow	Medium green
M	Italy	.90	Medium green	Medium yellow	Medium green	Medium yellow	Medium green
N	Italy	.97	Medium green	Medium yellow	Medium green	Medium yellow	Medium green
O	Italy	.95	Light green	Light yellow	Light green	Light yellow	Light green
P	Italy	.56	Light green	Light yellow	Light green	Light yellow	Light green
Q	Italy	.31	Light green	Light yellow	Light green	Light yellow	Light green
R	Italy	1.18	Light green	Light yellow	Light green	Light yellow	Light green
S	Italy	0.59	Light green	Light yellow	Light green	Light yellow	Light green
T	Italy	.47	Light green	Light yellow	Light green	Light yellow	Light green
U	Italy	.40	Light green	Light yellow	Light green	Light yellow	Light green

Again it is especially noteworthy that the color of these oils on opening, varied from light to dark green with considerable variation in acidity among different brands. These experiments were the reverse of those in Table 4, that is, the samples were divided into four portions, transferred to bottles and allowed to stand cold, with or without tin, in dark and light. It is to be noted that the yellow color returned by the action of light whether tin was present or not. This seems to indicate that the reversible

reaction of green to yellow through the action of light is more rapid than the formation of green color.

In general, the results of experiments tabulated in Tables 4 and 5 show that these color changes are common to all olive oils and bear out the conclusions drawn from the examination of green California oil, *viz.*, that yellow olive oil containing fatty acids, and in contact with tinplate, turns green at normal temperatures in absence of light, or, at increased temperature in presence of light, and that a reversal of this color change is brought about by light.

Although, theoretically, this color reversal can be repeated any number of times on the same oil, nevertheless, it was found after several reversals that the yellow-colored oil acquired a fluorescence and became cloudy, showing that other reactions were modifying the color and that there is a limit to the number of reversals.

Summary and Conclusions

The following is a summary of the conclusions and facts brought out in this investigation:

(1) That yellow olive oil packed in tin may turn green, and that this reaction is brought about by reduction of the yellow color through the action of the free fatty acids of the oil on the tinplate.

(2) That this reaction will not take place at normal temperatures in the presence of light.

(3) That the green color of olive oil, so formed, reverts to yellow by the action of light.

(4) That the formation of green color in olive oil is dependent on the acid strength of the oil and depth of the original yellow color and increases proportionately with these.

(5) That, in general, most olive oils on the market packed in tin, are of a greenish color, while the bottled product is yellow. This, of course, does not apply to fresh oil, but only that which is sufficiently old to have permitted any color change to have taken place.

(6) That it is not possible to pack olive oil in cans without development of greenish color unless the original oil is rendered neutral or bleached. As it is not practical to render the oil absolutely neutral or to bleach it, the formation of green color in tin cannot be entirely prevented in practice but may be controlled to a certain extent.

(7) That the development of excessive green color, which might be objectionable, can be prevented either by packing in cans only oil of low acidity (below 0.25%) or oil, the original color of which is light yellow. In the latter case the acidity is of little consequence as far as color is concerned.

(8) That green-colored oil in cans can be reconditioned by transferring

to bottles and exposing to light, whereby the original yellow color is restored.

CURTIS & TOMPKINS,
SAN FRANCISCO, CALIF.

STUDIES ON THE OIL AND AMMONIA CONTENT OF COTTONSEED

A Progress Report

BY A. F. SIEVERS

The work of the Bureau of Plant Industry in connection with the Basic Research Committee of the American Oil Chemists' Society and the Interstate Cottonseed Crushers' Association concerns itself with a study of the influences of soil and climate on the oil and ammonia content of cottonseed. In the report of the first season's work presented at the 1924 convention of this Society it was pointed out that such a program must extend over a number of years in order to furnish sufficient data to warrant definite conclusions. The first year's work included analysis of the seed from about 29 varieties grown at 10 different stations. From these analyses it appeared that those varieties which produced seed of either exceptionally high or low oil content in any one locality displayed the same tendency in the other localities from which seed was obtained.

During the past winter and spring the analysis of seed grown in 1924 has been proceeding along the same lines. Some new varieties have been added and a few of those included in last year's list could not be obtained this year. The stations from which samples were obtained are substantially the same as last year. The work has been unavoidably interrupted several times this winter with the result that only about two-thirds of the analyses have been completed to date. It has therefore been impossible to correlate the data and note the trend of results as was done in last year's report. It should be understood that there has in no sense been any curtailment of the work but that some of the analyses have been delayed but will probably be completed in about a month or six weeks. The ammonia determinations are being made, as last year, by the Barrow-Agee Laboratories.

It is planned to continue the program during the present growing season for the third successive year. If it is possible to complete the analyses of the samples from the coming season in sufficient time next spring it will be possible to render a report covering three years at the 1926 meeting of the Society.

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE

PROCEEDINGS OF THE SIXTEENTH ANNUAL CONVENTION

SMALLEY FOUNDATION

Check Meal Samples for 1924-1925

Ammonia Committee Report

By H. C. Moore

In the following tables will be found a summary of the coöperative analytical work for 1924–25. These tables tell practically the whole story with reference to the results reported on the check meal samples, and very few additional comments are necessary.

During the past year seventy-five collaborators have participated, as compared with seventy-eight in each of the two previous years.

Table No. 1 shows the standing of the 29 collaborators who have determined oil in all of the samples. Last year 36 collaborators made the same determinations, as compared with 38 the previous year.

Table 1

Standing for Oil Results (30 Samples)

Place no.	Analyst no.	Points off	Av. error per sample	Efficiency per cent
1	26	28	0.0093	99.880
2	74	31	.0103	99.848
	80	31	.0103	99.848
4	6	39	.0130	99.808
5	37	43	.0143	99.789
6	20	45	.0150	99.778
7	21	47	.0157	99.768
8	19	54	.0180	99.734
9	5	73	.0243	99.640
10	23	83	.0277	99.590
11	22	90	.0300	99.556
12	42	93	.0310	99.542
13	4	103	.0343	99.493
	39	103	.0343	99.493
15	73	109	.0363	99.463
16	62	114	.0380	99.438
17	8	118	.0393	99.419
	49	118	.0393	99.419
19	79	146	.0487	99.280
20	25	152	.0507	99.250
21	65	157	.0523	99.227
22	3	200	.0667	99.013
23	35	206	.0687	98.885
24	40	222	.0740	98.905
25	67	274	.0913	98.648
26	2	317	.1057	98.447
27	70	398	.1327	98.036
28	61	469	.1563	97.688
29	46	521	.1737	97.431

Table No. 2 shows the corresponding standing of the 42 collaborators who reported ammonia determinations on all the samples, as compared to 50 for last year and 56 for the previous year.

TABLE 2

STANDING FOR AMMONIA RESULTS (30 SAMPLES)

Place no.	Analyst no.	Points off	Av. error per sample	Efficiency per cent
1	63	10	0.0033	99.956
2	80	13	.0043	99.942
3	74	15	.0050	99.933
4	12	17	.0057	99.924
5	31	21	.0070	99.906
6	32	23	.0077	99.897
7	20	25	.0083	99.889
8	6	27	.0090	99.880
9	4	33	.0110	99.853
10	37	35	.0117	99.843
11	11	36	.0120	99.839
12	23	37	.0123	99.835
13	49	38	.0127	99.830
	66	38	.0127	99.830
15	39	39	.0130	99.826
16	16	41	.0137	99.817
17	19	43	.0143	99.809
18	35	44	.0147	99 803
19	8	47	.0157	99.790
	62	47	.0157	99.790
21	21	50	.0167	99.776
	42	50	.0167	99.776
23	2	51	.0170	99.772
24	14	55	.0183	99.755
	65	55	.0183	99.755
26	26	56	.0187	99.749
	79	56	.0187	99.749
28	3	58	.0193	99.741
29	22	59	.0197	99.736
	40	59	.0197	99.736
31	73	62	.0207	99.723
32	38	70	.0233	99.688
	44	70	.0233	99.688
34	67	72	.0240	99.679
35	27	74	.0247	99.669
36	5	83	.0277	99.629
	25	83	.0277	99.629
38	47	92	.0307	99.588
39	46	109	.0367	99.514
40	29	117	.0390	99 478
41	61	130	.0433	99.420
42	30	211	.0703	99.058

Table No. 3 shows the laboratory standing for both oil and ammonia results for the 28 collaborators who completed all determinations, as compared with 36 last year and 38 the year before.

TABLE 3

LABORATORY STANDING FOR BOTH OIL AND AMMONIA RESULTS

Place No.	Analyst No.	Efficiency per cent	Place No.	Analyst No.	Efficiency per cent
1	80	99.895	15	49	99.625
2	74	99.892	16	62	99.614
3	6	99.844	17	8	99.605
4	20	99.834	18	65	99.593
5	37	99.816	19	73	99.515
6	26	99.815	20	79	99.491
7	19	99.772	21	25	99.440
8	21	99.772	22	35	99.344
9	23	99.713	23	3	99.377
10	4	99.673	24	40	99.321
11	39	99.660	25	67	99.164
12	42	99.659	26	2	99.110
13	22	99.646	27	61	98.554
14	5	99.635	28	46	98.478

Table No. 4 summarizes the results of the other collaborators who failed to report on all the samples but whose results deserve recognition. It will be noted from Table 4 that several collaborators reported on all but one or two samples. In several cases this was due to failure to receive the samples, or the reports went astray in the mail. The Chairman has been as liberal as he felt possible in accepting late reports; in fact, all those received up to the time the report went to the printers on Tuesday morning have been accepted.

TABLE 4

RESULTS OF OTHER COLLABORATORS WHO FAILED TO REPORT ON ALL SAMPLES BUT WHOSE RESULTS DESERVE RECOGNITION

Analyst No.	No. of samples reported	Total points off	
		Oil	Ammonia
9	24	..	105
10	28	..	73
13	29	..	76
15	29	..	82
17	28	..	91
24	21	53	15
28	23	..	81
33	26	61	19
34	28	..	145
41	28	..	63
43	29	131	32
64	23	..	79
70	28	398 (30 samples)	144 (28 samples)

71	25	108	45
72	27	121	23
75	25	..	52
77	29	..	73
78	20	41	21
81	25	..	71
82	29	..	88

The prize awards for the best work done on these samples were outlined in the pamphlet sent out at the beginning of the year and originally printed in the *Cotton Oil Press* in 1923.

The winners of these prize awards are as follows:

The laboratory cup for the highest average for both oil and ammonia, E. H. Tenent, International Sugar Feed No. Two Co., Memphis, Tenn., Analyst No. 80, whose per cent efficiency is 99.895. The certificate for second place, L. B. Forbes, Dixie Cotton Oil Co., Memphis, Tenn., Analyst No. 74, whose per cent efficiency is 99.892. The certificates for the highest averages for the ammonia results: (1) Gascoyne & Co., Baltimore, Md., Analyst No. 63, whose per cent efficiency is 99.956; (2) E. H. Tenent, Memphis, Tenn., Analyst No. 80, whose per cent efficiency is 99.942. The certificates for the highest average for the oil results: (1) Southwestern Laboratories, Dallas, Tex., Analyst No. 26, whose per cent efficiency is 99.880; (2) L. B. Forbes, Analyst No. 74, and E. H. Tenent, Analyst No. 80, both of Memphis, Tenn. (tied for second place), whose per cent efficiency is 99.848.

The Society has decided that with the exception of those who have won the grand prize or certificates, the identity of the collaborators shall not be disclosed; that each shall be assigned a number and no key to these numbers shall be given out.

The method for determining the standing of the various collaborators and their per cent efficiency is the same as was used the past two years, and given in detail in the Jan., 1923, *Cotton Oil Press*, **6**, No. 9, p. 33.

It will be observed from Tables Nos. 1 to 3 that the highest averages this year are slightly lower than those last year. One reason for this difference is that the average of the accepted averages this year is slightly lower than for last year, which by the method of calculation makes the same number of "points" this year show a slightly lower percentage efficiency.

Judging from the comments of the collaborators during the past year there have been but few complaints on the uniformity of the samples. Several have felt that one or two of the samples were not uniform, but on the whole complaints have been very few. A few reports have come to the chairman that collaborators have failed to receive some of the samples, and for this reason have been unable to make their reports. Had they

notified Mr. R. F. Monsalvatge to this effect in proper time, as per notation on the report for sample No. 17, he could have sent them duplicate samples.

The Ammonia Committee acting on the suggestion of Mr. C. A. Butt decided to send to all collaborators a questionnaire inquiring into the details of the method used in the determination of ammonia. Mr. Butt's summary of the replies received follows in full:

"During the year a series of questions, relating to the various details in methods for the determination of ammonia in use at the laboratories participating in the meal series known as the SMALLEY FOUNDATION, were prepared and in the form of a questionnaire were mailed to each of the collaborators.

"The purpose of this work being mainly to show the trend in the methods and if possible to bring out new suggestions in connection with this determination.

"Fifty-one replies were received and the data is summarized in the following:

1. *Name of Method*

Number using Kjeldahl-Gunning mercury method (H_2SO_4, sodium or pot. sulfate and mercury)	40
Number using Kjeldahl-Gunning copper method (H_2SO_4, sodium or pot. sulfate and copper)	10
Number using Kjeldahl method (H_2SO_4, mercury and $KMnO_4$ to complete oxidation)	1

2. *Weight of Sample Taken*

Number using less than 1 gram	4
Number using 1 to 2 grams	46
Number using 2.5 grams	1

3. *C. C. Sulfuric Acid Used in Digestion*

Number using 7 cc	1
Number using 15 cc	1
Number using 20 cc	3
Number using 25 cc	30
Number using 30 cc	13
Number using 35 cc	3

4. *Sodium or Potassium Sulfate*

Number using sodium sulfate	18
Number using potassium sulfate	31
Number using either	1

5. *Quantity of Sodium or Potassium Sulfate*

Number using 5 grams or less	2
Number using 6 to 8 grams	6
Number using 9 to 10 grams	35
Number using 11 to 12 grams	2
Number using 13 grams or more	5

6. Grams Mercury or Mercuric Oxide

Number using 0.5 to 0.6 gram mercury	20
Number using 0.7 to 1 gram mercury	11
Number using 0.25 gram mercuric oxide	1
Number using 0.5 to 0.6 gram mercuric oxide	2
Number using 0.7 to 1 gram mercuric oxide	7

7. Grams Copper or Copper Sulfate

Number using 0.1 to 0.2 gram copper	2
Number using 0.2 to 0.5 gram copper	4
Number using 0.5 to 0.7 gram copper	2
Number using 0.2 to 0.3 gram copper sulfate	1
Number using 0.5 to 0.7 gram copper sulfate	1

8. Time of Digestion—Total

Number digesting 3/4 hour or less	1
Number digesting from 3/4 to 1 hour	8
Number digesting from 1 to 1 1/2 hours	17
Number digesting from 1 1/2 to 2 hours	14
Number digesting from 2 to 3 hours	10
Number digesting 3 hours or more	1

9. Time of Digestion—After Clear

Number digesting 1/4 hour or less	5
Number digesting 1/4 to 1/2 hour	13
Number digesting 1/2 to 1 hour	13
Number digesting 1 to 2 hours	8
Number digesting 2 hours or more	2
Number not stating	10

10. Rate of Boiling during Digestion

Gently or slowly	7
Medium	9
Briskly	34
Various rates	1

11. Time of Distillation

Number distilling 1/2 hour or less	15
Number distilling 1/2 to 1 hour	31
Number distilling 1 hour or more	4
Number not stating	1

12. Using Gas or Electric Heat

Number using gas for both digestion and distillation	33
Number using electric for both digestion and distillation	16
Number using electric for digestion gas for distillation	2

13. Sodium or Potassium Sulfide

Number using sodium sulfide	19
Number using potassium sulfide	21
Number using neither (copper method contestants)	10
Number using neither (sodium thiosulfate used instead)	1

14. Quantity of Sodium or Potassium Sulfide

Number using solution containing 0.4 gram	1
Number using solution containing 0.5 to 0.7 gram	3
Number using solution containing 0.7 to 1 gram	26
Number using solution containing 1.0 to 1.5 grams	8
Number using solution containing 1.5 to 2.2 grams	2

15. To Prevent Bumping during Distillation

Number using zinc	49
Number using talcum	1
Number not using anything (copper method)	1

16. Connecting Bulbs

Number using Kjeldahl, Hopkins or modification	33
Number using bulbs of special design, including Barrow-Agee's, Clark's, Davisson Scrubber, Law & Co., and Magruder's	16
Number using none	1
Number not stating	1

17. Condenser Tube or Coil—Inside Diameter

Number using tube $^3/_{16}$ to $^1/_4$ inch diameter	20
Number using tube $^5/_{16}$ to $^3/_8$ inch diameter	23
Number using tube $1^1/_2$ inch diameter	1
Number using miscellaneous sizes	1
Number not stating	1
Number using $^7/_{16}$ to $^1/_2$ inch diameter	5

18. Condenser Tube or Coil—Length

Number using from 1 to 2 ft	13
Number using from 2 to 3 ft	20
Number using from 3 to 4 ft	9
Number using from 4 to 5 ft	1
Number using 5 ft. or more	7
Number not stating	1

19. Capacity of Kjeldahl Flask Used

Number using 500cc. flasks	15
Number using 650cc. flasks	8
Number using 700cc. flasks	1
Number using 800cc. flasks	27

20. Standard Acid Solution—Kind

Number using standard solution of sulfuric acid	45
Number using standard solution of hydrochloric acid	6

21. Standard Acid Solution—Strength

Number using normal solution	3
Number using $^1/_2$ normal solution	34
Number using $^1/_4$ normal solution	2
Number using $^1/_5$ normal solution	4
Number using various other strengths	8

22. Standard Alkali Solution—Kind

Number using standard solution of sodium hydroxide	44
Number using standard solution of potassium hydroxide	3
Number using standard solution of ammonium hydroxide	3
Number using none (ammonia absorbed in nearly saturated solution of boric acid and titrated direct with standard acid using brom-phenol-blue indicator)	1

23. Standard Alkali Solution—Strength

Number using $^1/_2$ normal solution	5
Number using $^1/_4$ normal solution	23
Number using $^1/_6$ normal solution	5
Number using $^1/_8$ normal solution	1
Number using $^1/_{10}$ normal solution	6
Number using various other strengths	11

24. Kind of Indicator

Number using methyl red	20
Number using sodium alizarine sulfonate	15
Number using cochineal	13
Number using methyl orange	2
Number using brom-phenol-blue	1

25. Reagents Used in Standardizing Solutions

Number using sodium carbonate and ammonium sulfate	11
Number using sodium carbonate and ferrous ammonium sulfate	1
Number using sodium carbonate alone	3
Number using ammonium sulfate alone	2
Number using ammonium chloride alone	1
Number using benzoic acid alone	2
Number using acid potassium phthalate alone	1
Number using acid potassium phthalate and sodium carbonate	2
Number using potassium bitartrate and succinic acid	1
Number using barium chloride alone	14
Number using barium chloride and ammonium sulfate	1
Number using barium chloride and sodium carbonate	4
Number using silver nitrate alone	3
Number using silver nitrate and sodium carbonate	2
Number using silver nitrate, sodium carbonate and ammonium sulfate	1
Number using silver nitrate, calcium carbonate and ammonium chloride	1

From these data it will be noted that there are in use procedures for the ammonia determination with numerous variations as to detail.

It may be interesting to note that by taking the most popular manner in which each step in the determination is carried out and making a method in this way, the following would be the procedure thus constructed:

"Weigh 1 to 2 grams of sample into an 800 cc. Kjeldahl flask and add 25 cc. sulfuric acid (sp. gr. 1.84), 9 to 10 grams potassium sulfate and 0.5 to 0.6 gram mercury. Heat to boiling and continue digestion, boiling briskly, from 1 to $1^1/_2$ hours. Cool, dilute with water and precipitate

TABLE 5

SUMMARY OF REPLIES TO QUESTIONNAIRE FROM THE TEN HAVING THE HIGHEST AMMONIA STANDING

Details of analysis	Analyst's number									
	No. 63	No. 80	No. 74	No. 31	No. 6	No. 4	No. 11	No. 23	No. 49	No. 66
Wt. of samp. gr.	1.7036	1.401	1.7034	1.000	1.7034	1.7034	1.7034	1.401	1.7034	2.0000
Cc. H_2SO_4	30	25	25	20	25	25	30	25	30	30
Gr. K_2SO_4	10	..	8–10	..	10	10	8–10	18–20	9–10	..
Gr. Na_2SO_4	..	9	..	..	..	..	..	..	..	10
Gr. Cu added	..	..	..	0.7	..	..	..	..	..	..
Gr. $KMnO_4$ added	..	..	..	.25	..	..	..	..	..	..
Gr. Hg	...	0.5	0.5	..	0.5	0.5	..	0.6	0.5–0.6	0.7
Gr. HgO	1	..	..	..	..	..	.8	..	..	..
Total time dig. hrs.	2	1	1	3	1 1/2	1 1/4	2 1/2	1 1/2	1 1/2–2	1 3/4
Time after clear, hrs.	1 1/2	..	..	1 1/2	..	1/2	1 1/2	3/4	1–1 1/4	..
Rate of boiling	Brisk	Brisk	Brisk	Brisk	Brisk	Brisk	Slow	Med.	Med.	Brisk
Kind of heaters, digest.	Gas	Elec.	Elec.	Gas	Elec.	Gas	Elec.	Elec.	Elec.	Gas
Kind of heaters, distil.	Gas	Elec.	Elec.	Gas	Elec.	Gas	Elec.	Gas	Elec.	Gas
Time for distn., hrs.	1	1/2	3/4–1	3/4	1 1/4–1 1/2	1/4	1 1/2	40 m.	30–40 m.	1
Gr. K_2S	1	0.9	1.5	(*a*)	1	1	..	..	..	..
Gr. Na_2S	..	..	..	..	..	..	1	1.25	1.2	1
To prevent bumping	Zinc	Zinc	Zinc	Zinc	Zinc	Zinc	Zinc	Zinc	Zinc	Zinc
Connecting bulbs	E&A1216	Hopk.	SCo	Hopk.	B&A	Hopk.	Kjel.	Kjel.	Hopk.	Double
Diam. condens. tube, in.	1/4	1/2	3/8	1/4	3/8	3/8	1/4	3/8	1/4	3/8
Length cond. tube, ft.	2	3 1/2	5	2 1/2	4	2 1/2	2	2 1/2	3	2

Size flask	500	800	800	700	800	800	650	800	650	500
Standard H_2SO_4	..	N/2	N/2	..	N/2	N/2	N/2	N	N/2	N/1.7
Standard HCl	N	..	..	N/2(*b*)	..	..	..	..	..	..
Standard NH_4OH	..	..	..	N/5(*c*)	..	..	..	..	..	..
Standard NaOH	N/10	N/4	N/4	..	N/4	N/4	N/8	N/5	..	N/1.7
Indicator	SAS	MR	MR	MR	MR	MO	MR	MR	BPB	MR
Method standardizing acid	Ag	FAS	APT	Ag	SC	SA	SC	NC	SA	Ba

(*a*) Uses hypo.
(*b*) About N/2.
(*c*) About N/5.

SAS—Sodium alizarin sulfonate
MR—Methyl red
Ag—Silver nitrate
Ba—Barium sulfate
APT—Acid potassium phthalate
SA—Ammonium sulfate (ACCS standard)
BPB—Brom-phenol-blue
MO—Methyl orange
FAS—Ferrous ammonium sulfate
SC—Sodium carbonate.

mercury by adding solution containing 0.7 to 1 gram potassium sulfide. Add a few particles of granulated zinc, make alkaline and distill ammonia through 2 to 3 ft. of condenser tube of $^5/_{16}$ to $^3/_8$ in. inside diam. into a $^1/_2$ normal solution of sulfuric acid which has previously been standardized by precipitation with barium chloride. Use methyl red as indicator and titrate excess acid with $^1/_4$ normal sodium hydroxide."

In submitting the above summary Mr. Butt suggested that it might be of interest to note how closely the average or cross section method which he devised from the replies was followed by the leaders in the ammonia series. Not all of the leaders replied to the questionnaire, but Table No. 5 gives a summary of replies from the ten highest. It is interesting to note that the details used by these ten collaborators are in the main very close to the average method used by all, and it is believed that Table No. 5 will prove interesting in connection with Table No. 2 and the summary to the questionnaires.

Committee: H. C. MOORE (Armour Fert. Works, Chicago): C. A. BUTT; L. B. FORBES; JOHN MALOWAN; H. B. BATTLE.

DETERGENTS COMMITTEE REPORT FOR 1924-25

BY ARCHIBALD CAMPBELL

The Detergents Committee of the American Oil Chemists' Society includes in its membership the members of the Soap and Soap Products Committee of the American Chemical Society, representatives of most of the large soap manufacturers, also of the Bureau of Standards, as well as several large soap consumers of the country. It is thus an interlocking committee organized with a view of correlating the work done by the Soap and Soap Products Committee on Methods of Sampling and Analysis with the work done by the Soap Committee of the Soap Section of the American Specialty Manufacturers' Association working in conjunction with the Federal Specifications Board on Soap Specifications. The Soap and Soap Products Committee is likewise an interlocking committee with the Glycerine and F. A. C. Committees of the American Chemical Society. By this interlocking system of committees it is hoped to avoid duplication of efforts and effect correlation of results.

As it was late in the season before the Detergents Committee was organized it confined its efforts this year to the following work:

1. Organization.
2. Discussion and criticism of the Standard Methods for the Sampling and Analysis of Commercial Soaps and Soap Products as adopted by the American Chemical Society.
3. Presentation of these Standard Methods to the Uniform Method

Committee for adoption as standard by the American Oil Chemists' Society.

4. Discussion and criticism of the Specifications for Soap as set forth in Bureau of Standards *Bulletins* **123** to **132,** inclusive, and *Circulars* **65, 163, 194** and **195.**

5. Discussion of Pharmacopoeia Standard for "Sapo."

6. Discussion of Development and Standardization of Methods of Testing of Detergents.

The organization and personnel of the Committee is as follows:

R. K. Brodie, Procter & Gamble Co., Ivorydale, Ohio.
C. P. Long, The Globe Soap Co., St. Bernard, Ohio.
Percy H. Walker, Bureau of Standards, Washington, D. C.
J. R. Powell, Armour Soap Works, Chicago, Illinois.
Robert E. Divine, Armour Soap Works, Babbitt, N. J.
H. P. Vermilya, Jewel Tea Co., Inc., Chicago, Illinois.
H. S. Mitchell, Swift & Co., Chicago, Ill.
W. J. Reese, Peet Bros. Mfg. Co., Kansas City, Kansas.
E. T. Marceau, Gold Dust Corporation, Guttenberg, N. J.
Martin H. Ittner, Colgate & Co., Jersey City, N. J.
Jacob S. Goldbaum, Fels & Co., Philadelphia, Pa.
Walter S. Rapelje, Kirkman & Son, Brooklyn, N. Y.
A. K. Church, Lever Bros. Co., Cambridge 39, Mass.
F. W. Smither, Bureau of Standards, Washington, D. C.
L. F. Hoyt, Larkin Co., Inc., Buffalo, N. Y.
H. C. Bennett, Los Angeles Soap Co., Los Angeles, California.
Archibald Campbell, The Globe Soap Co., St. Bernard, Ohio, *Chairman.*

The personnel of the committee is fairly complete and representative as regards soap manufacturers and federal bureaus, but should have additional members representing large consumers as well as the National Laundrymen's Association, Universities, Commercial Laboratories and State, County and City chemists.

The Methods of Sampling and Analysis seem to be fairly satisfactory for the commercial purpose for which they were intended.

The committee urges the adoption of the present specifications by State, County and City departments more generally than at present and drafting of additional specifications as demanded by trade conditions.

The Development and Standardization of Methods of Testing Detergents seemed to be the most important and pressing work of the committee as brought out by almost all the communications received by the Chairman from the members. Almost every member stressed the need of such a standard yet no one offered a constructive suggestion of how to proceed to determine such a standard. In view of the large number of variables, *viz.*, temperature, hardness of water, fatty composition of soap, alkalinity of soap, alkaline builders or fillers in soap, mechanical appliances used, nature of soiling agent, concentration of solutions, nature and composition

of fabric, as well as the limited knowledge which we have of just what the real chemical and mechanical actions of soaps are; it would appear to the Chairman that the best that could be hoped for would be a comparison of the cleansing action of soaps operating under a given set of conditions rather than a standard that would apply to all conditions. It also appears rather doubtful whether such work could be carried on, by a committee, successfully but rather should be handled by some Government Bureau, or better still, if the soap manufacturers could be persuaded to establish an institute similar to those established by the National Canners and the American Meat Packers and have the problem of detergents taken up by the research department of such an American Soap Manufacturers' Institute and worked out with the coöperation of all the interested parties.

In conclusion, the Chairman wishes to thank the members of the committee for the hearty coöperation shown in perfecting the organization and suggesting fields of endeavor for our committee. He feels that the committee by extending its organization can be of inestimable value in perfecting and extending the use of the present standard methods and specifications, as well as adopting new methods and specifications as occasion demands. He feels that the committee should continue to coöperate closely with the Bureau of Standards as well as all other Government Bureaus to accomplish these results. He feels that the committee should continue to attack the problem of detergents and endeavor to promote research work on this important subject in every way possible, both in private laboratories and by Federal Bureaus and if possible in a research laboratory supported by a Soap Manufacturers' Association.

GLOBE SOAP CO., CINCINNATI, OHIO

FULLER'S EARTH AND BLEACH TEST COMMITTEE REPORT FOR 1924-25

BY A. W. PUTLAND

In planning our work for this year your Committee studied the reports of previous committees and found that a few recommendations made to our membership had not been completed to a definite end.

We endeavored to complete the recommendation of the former committee on the use of more than 6% earth in the bleach test and the filtering of the oil before bleaching. Along with this work we endeavored to find the cause of bleached oil reverting in color, as was suggested to us by the Planning Committee. Since none of the oil bleached with standard earth reverted in color and on account of our time being limited this suggestion was not carried to a successful end.

Editor's Note.—Accompanying this report as distributed in mimeograph form at the convention were a large number of results which the

Committee requested be studied and some action taken on the use of more than 6% earth in the bleach test and the filtering of the oil before bleaching. These tables were too long to be printed in this the last number of our journal.

PORTSMOUTH COTTON OIL CO.,
PORTSMOUTH, VIRGINIA

REFINING TEST COMMITTEE REPORT FOR 1924-25

BY C. B. CLUFF

A consideration of the situation regarding refining tests showed that little improvement has been made for many years. Enormous differences are still commonly reported, by different chemists, on duplicate samples, to the great annoyance of buyers of crude oil. It appeared necessary, as was indicated by the chairman of a previous committee, to either find such modifications in our method as would give reasonably concordant results, or discard it altogether and find some other way of evaluating crude oil. It was, therefore, determined to make an intensive study of details of the present method, limiting the tests to a very few members who have had wide refining experience, in the endeavor to run down and eliminate possible causes of discrepancies.

A list was first prepared, showing no less than twenty-three points of manipulation which could account for differences in the results obtained by different chemists. Certain modifications of the present rule were then written up in the endeavor to limit, or eliminate altogether, any chances for the use of personal discretion in making the refinings. Each member of the committee was asked to test three samples by adhering strictly to these specifications without any modification whatever.

The procedure specified on the three samples varied from the usual rule principally in four particulars, as follows:

1. The exact amount of NaOH to be used was specified and determined by analysis of the lye, and not by a hydrometer. The exact Baumé of the lye was considered relatively unimportant. A limit was placed on Na_2CO_3 at 5% of the NaOH.

2. The rates of heating and cooling during the refining were standardized by using two separate water baths and transferring the sample from the cool bath directly to the hot bath. This served to definitely fix the rate of heating and time of heating. The same applies to the subsequent cooling of the refining, by transferring directly from the hot to the cold bath.

3. Only two different speeds were permitted.

4. Soap stock in all cases was remelted and recooled under standardized condition.

Samples of each of three oils were sent to five laboratories and in each case tested by the new specifications with two different lyes and by the official method with one lye which was the same as one of those used in the new method. Samples of the refined oil produced in each case were forwarded to the Ivorydale laboratory so that the color of all samples could be read by the same individual under identical conditions. Unfortunately, however, not all of these samples arrived safely. The accompanying tables show a summary of the results reported.

Sample No. 1, Prime Oil, shows very good results both by the official method and the new method. Sample No. 2, Off Oil, shows decidedly better agreement in both color and loss by the new method, and it should be particularly noted that both of these factors are lower in the new method when using approximately the same lye as in the official method. Sample No. 3, Off Oil, shows similar results with only 0.25% difference in loss among four operators on the new method against 1.5% variation on the official method. This is the most remarkable agreement we have ever seen on oil with F. F. A. as high as 5%. There is also a better agreement on color, and the average color and loss are both slightly lower than by the official method.

The necessity is shown of reading all colors by the same man, in the same apparatus, when checking refining results. The differences are much less when so read than when read by different individuals.

SAMPLE NO. 1

Method / Lye { Amt. / Strength		New 0.472% NaOH Approx. 14° Bé.		New 0.472% NaOH Approx. 18° Bé.		Official 5% of 14° Bé.	
	F.F.A.	Color	Loss	Color	Loss	Color	Loss
Average (5)	1.81	6.66R	4.16%	6.32R	4.42%	6.65R	4.25%
Maximum	2.2	6.8	4.3	6.7	4.6	6.9	4.4
Minimum	1.65	6.4	4.0	6.2	4.2	6.3	4.2
Max. dif.	0.55	0.4	0.3	0.5	0.4	0.6	0.2

SAMPLE NO. 2

Method / Lye { Amt. / Strength		New 1.15% NaOH Approx. 16 ° Bé.		New 1.15% NaOH Approx. 20° Bé.		Official 8% of 20° Bé.	
	F.F.A.	Color	Loss	Color	Loss	Color	Loss
Average (5)	5.29	8.60R	12.18%	7.76R	12.00%	8.52R	12.98%
Maximum	5.40	9.6	12.5	8.9	12.4	10.1	14.4
Minimum	5.10	7.3	11.9	7.0	11.5	7.1	12.0
Max. dif.	0.30	2.3	0.6	1.9	0.9	3.0	2.4

Same (sample No. 2) with colors of all ref. oils read by a single individual to eliminate personal differences, etc. Samples from Barrow not received.

Average (4)	5.26	7.80	12.18	6.98	11.98	7.68	12.73
Maximum	5.35	8.2	12.5	7.1	12.4	9.3	14.4
Minimum	5.10	7.2	11.9	6.8	11.5	7.0	12.0
Max. dif.	0.25	1.0	0.6	0.3	0.9	2.3	2.4

CRUDE OIL SAMPLE NO. 3

	F.F.A.	"A" 1.37% NaOH, 16° Color X	Y	Z	Loss	"B" 1.37% NaOH, 20° Color X	Y	Z	Loss	"C" 9.5% of 20° Lye Color X	Y	Z	Loss
Average (4)	5.23%	12.22R	12.00R	11.43R	13.25%	11.55R	11.15R	10.78R	14.01%	11.60R	11.35R	11.10R	14.08%
Highest	5.35	14.3	13.8	11.8	13.8	13.2	12.6	11.6	14.15	13.0	13.4	12.2	14.9
Lowest	5.1	10.4	10.3	10.9	12.2	9.9	10.6	10.2	13.9	10.2	10.0	10.2	13.4
Max. dif.	0.25	3.9	3.5	0.9	1.6	3.3	2.5	1.4	0.25	2.8	3.4	2.0	1.5

X—Filtered at 180°F.
Y—Filtered at 70°F.
Z—P. & G. reading of samples "Y."

The results under No. 3 also show the necessity of filtering oil cool; heating to facilitate filtering gives darker color readings.

Our conclusions and recommendations are as follows:

1. The present method for determining refining loss and color, as a means of evaluating crude cottonseed oil should not be condemned as fairly concordant results on duplicate samples can be obtained by different chemists, if variations in manipulation are avoided.

2. Work should be continued in the direction of further eliminating possible variations in manipulation.

3. Further tests should be made giving particular attention to crude oils that refine and settle with difficulty when subjected to the usual treatment.

4. As the present rules omit all reference to filtering the refined oil, a sentence should be inserted in rule No. 272—Section 7 (*a*) at the beginning of the section, reading as follows:

"If the refined oil is not clear and brilliant, it must be clarified before reading the color, by filtering through white filter paper at a temperature of 20° to 24°C., without the application of heat or addition of any material to facilitate filtration."

THE PROCTER & GAMBLE CO.,
IVORYDALE, OHIO

STANDARDIZATION OF COLOR READINGS, REPORT FOR 1924-25

BY H. P. TREVITHICK

The color committee this year has confined its efforts to a test of the Bailey tintometer. Six samples were sent out to the members and were read by the use of the Wesson instrument, the Bailey instrument, and with the old-fashioned Daylight machine. The results were averaged and the maximum and minimum deviations determined on each sample. Strange to say, the total deviation from the mean by natural daylight was less than by either the Wesson or the Bailey instrument. This, I believe, was due to the fact that the orifices in the natural instrument are much larger. A copy of these readings are attached herewith. In five out of six readings the mean of the Wesson is much less than the Bailey instrument.

The members were also asked to make comparative readings on samples of their own and report them. Mr. James has sent in a list of cottonseed oils only; the other three gentlemen have not sent theirs in yet. There is also attached a list of readings made on oils and greases, made by your chairman.

Some of the members of the committee are much in favor of the Bailey instrument while others are not. Two of the major criticisms are the size

of the orifices, and the intensity of the light. They still feel, however, that the instrument is satisfactory enough to be adopted as one of the instruments available for reading colors, and we therefore recommend that the Society consider such adoption.

The committee also feels that if the old style instrument were incased in a suitable box, with reflectors and artificial light source, it would be at least

COLOR READINGS OF COTTON OIL MADE BY MR. JAMES

Daylight	Wesson	Bailey	Daylight	Wesson	Bailey
7.9	7.6	7.5	6.0	5.6	5.6
5.8	5.6	5.6	5.0	4.8	4.8
6.4	6.2	6.1	4.8	4.6	4.5
5.4	5.1	5.0	9.0	8.6	8.4
8.6	8.2	8.1	4.2	4.0	4.0
7.6	7.3	7.2	7.0	6.7	6.6
4.8	4.5	4.5	12.8	12.6	12.4
6.8	6.6	6.5	3.8	3.6	3.6
8.6	8.2	8.1	9.6	9.3	9.2
7.2	6.9	6.7	6.6	6.4	6.4

COLOR READINGS MADE BY MR. H. P. TREVITHICK

	Wesson	Bailey	Natural Daylight
Sesame oil	13Y— 2.2R	13Y— 2.2R	12Y— 2.0R
Palm kernel oil	50Y—10.0R	44Y— 8.4R	50Y— 9.7R
Cottonseed oil	35Y— 9.6R	35Y— 9.3R	35Y— 9.8R
Cottonseed oil	35Y— 9.8R	35Y—10.1R	35Y—10.0R
Cottonseed oil	35Y—14.0R	35Y—13.2R	35Y—13.8R
Grease (1″ column)	35Y— 5.5R	50Y— 5.0R	
Grease bleached (1″ col.)	10Y— 2.2R	10Y— 2.2R	
Palm kernel oil	40Y— 6.8R	40Y— 6.5R	
Palm kernel oil	40Y— 6.6R	35Y— 6.3R	
Grease	70Y— 7.8R	70Y— 6.6R	
Grease	15Y— 2.5R	13Y— 2.4R	
Grease	35Y— 6.5R	35Y— 5.2R	
Grease	20Y— 3.5R	20Y— 3.6R	
Sesame oil	8Y— 1.5R	9Y— 1.3R	9Y— 1.5R
Sesame oil	7Y— 1.5R	7Y— 1.5R	7Y— 1.5R
Sesame oil	8Y— 1.2R	8Y— 1.2R	8Y— 1.3R
Sesame oil	9Y— 1.3R	9Y— 1.2R	9Y— 1.3R
Sesame oil	5.5Y—1.0R	6Y— 1.0R	5Y— 1.0R
Palm kernel oil	45Y— 9.2R	44Y— 8.2R	45Y— 9.0R
Palm kernel oil	40Y— 7.4R	40Y— 6.6R	40Y— 7.4R
Sesame oil	10Y— 1.5R	9Y— 1.5R	10Y— 1.5R
Cottonseed oil	13.5R	13.6R	14.7R
Cottonseed oil	13.2R	13.1R	13.7R
Cottonseed oil	10.3R	11.0R	11.1R
Cottonseed oil	10.7R	11.1R	11.5R
Cottonseed oil	10.8R	10.9R	11.5R
Sesame oil	7Y— 1.0R	7Y— 1.0R	6Y— 1.0R
Cottonseed oil	8.8R	9.0R	

as satisfactory as the present instruments. We believe that this was done by Curtis and Tompkins several years ago.

Mr. Bailey has a set of glasses which were to be standardized by the Bureau of Standards. If these glasses are available for the standardization of the sets of the members of the Society, we feel that there will be much closer agreement in the color readings.

	1	2	3	4	5	6
Wesson Instrument						
Putland	5.9	4.5	7.5	14.7	3.0	8.5
James	8.8	4.5	...	16.0	3.6—	9.6
Evans	9.2	4.5	6.8	16.3	3.3	9.2
Barrow	8.8	4.7	...	15.7	3.9	9.5
Trevithick	10.2	5.2	7.8	16.8	3.8	9.8
Mean	9.3	4.7	7.4	15.9	3.5	9.3
Max. deviation—plus	0.9	0.5	0.4	0.9	0.4	0.5
minus	.5	.2	.6	1.2	.5	.8
Total deviation	7.4					
Bailey Instrument						
Putland	6.3	4.7	7.9	15.6	3.5	9.3
James	9.4	4.6	...	16.0	3.6	9.4
Evans	11.0	6.0	8.0	....	5.0	11.0
Barrow	9.1	4.9	...	15.2	4.1	9.8
Trevithick	10.6	5.6	8.1	15.0	3.7	10.4
Mean	10.0	5.2	8.0	15.5	4.0	10.0
Max. deviation—plus	0.9	0.8	0.1	0.5	1.0	1.0
minus	1.0	.5	.1	.5	0.5	0.7
Total deviation	7.6					
Natural Daylight Instrument						
Putland	6.3	4.7	8.4	14.9	3.2	8.5
James	9.6	5.6	...	15.8	3.8	9.8
Evans	...	...	...	16.3	4.0	9.7
Barrow	10.5	5.3	...	16.0	4.1	9.8
Trevithick	10.5	5.8	7.6	17.0	3.9	10.2
Mean	10.2	5.3	8.0	16.0	3.8	9.6
Max. deviation—plus	0.3	0.5	0.4	1.0	0.3	0.6
minus	.6	.6	.4	1.1	.5	.9
Total deviation	7.0					

The Chairman wishes to thank the members of the committee, Messrs. A. W. Putland, E. M. James, J. D. Evans and E. R. Barrow, for their hearty coöperation during the year.

Bur. of Chemistry, N. Y. Produce Exchange,
New York City

BASIC RESEARCH COMMITTEE REPORT FOR 1924-25

By E. R. Barrow

The committee met at 9 A.M. Monday, Nov. 10th, in the Directors' Room of the Cosmos Club. The following members were present: Dr. David Wesson, New York, Mr. H. J. Morrison, Cincinnati, Mr. P. S. Tilson, Houston, Mr. L. N. Geldert, *Secretary*, Memphis, Mr. E. R. Barrow, *Chairman*, Memphis.

After a two-hour discussion of the four major problems of the Basic Research Program, which was proposed at the committees' conference in October, 1921, both with reference to results accomplished and new recommendations to be offered, the committee adjourned to pay its official respects to Dr. E. D. Ball, Director of Scientific Work, Department of Agriculture, according to appointment.

Dr. Ball received the committee most cordially and for forty-five minutes discussed the progress of the investigations with which he was thoroughly familiar, and assured the committee, as he had done at our previous conference, that the only limitations upon the Department's cooperation would be the lack of sufficient appropriations and the necessary legal authority. In this discussion, he laid great stress upon the economies of government under the present administration, and intimated that there might be a necessity for a still further reduction in the Department's activities.

The committee then called upon Dr. C. A. Browne, Chief of the Bureau of Chemistry, and together with Dr. Geo. S. Jamieson, Chemist in Charge Oil, Fat and Wax Laboratory, repaired to a nearby café for luncheon. While at luncheon the group was joined by Dr. Powers, one of the oldest men in point of service with the Bureau of Chemistry and one of the most able organic chemists in America. For the past year Dr. Powers has been engaged in the study and analysis of the cotton plant, root, stem, leaves, fiber and seed. Very briefly he outlined his work and some of the interesting discoveries made.

The most notable and interesting point is the extraction and identification of a substance known as trimethylamine, having a fishy odor, being non-poisonous, and to which he attributes the attractiveness of the cotton plant for the boll-weevil. Having identified the substance, it was then found that herring brine provided a practical and abundant source of this compound. Quantities have been prepared and sent to the Delta Experiment Station at Tallulah, from which most gratifying results have been reported. Dr. Coad reports that the weevil will leave the cotton plant for this substance placed upon other foliage, which would undoubtedly provide a means of decoying and poisoning the weevil more easily. Several members of the committee recognized in the odor of this compound the

characteristic odor of raw cottonseed soap stock. The committee then adjourned to Dr. Browne's office, where the entire afternoon was spent in conference with the different men engaged in researches related to cottonseed products.

Dr. E. W. Schwartze, pharmacologist, outlined his studies of the gossypol content of cottonseed kernels, together with the feeding experiments to determine its poisonous effect upon animals. In the first stage of these investigations it was found that gossypol was contained in the kernels of every sample of cottonseed examined, the samples being collected from a widely scattered territory, varying from 0.27% in Texas seed (Lone Star) to 1.018% in Sea Island. A fairly true relationship was found to exist between the gossypol content and the oil content of the seed. The second stage of the investigations consisted of feeding experiments on cats, rabbits and rats. In all of the experiments gossypol was separated from cottonseed kernels and fed in other rations to healthy animals in large doses, and in each instance the animals soon exhibited symptoms of cottonseed meal poisoning, many dying. The data and results of these experiments are carefully recorded in published bulletins.

The results of these tests seem to bear out the conclusion that the toxicity of cottonseed kernels is due to their gossypol content. While the cottonseed industry has been reluctant to admit that cottonseed or any of its products possess a toxic principle, yet cases of cottonseed and meal poisoning have been known, and with certain classes of animals their use is attendant with certain dangers which are not inherent in products of a similar nature. While perhaps discouraging for the time being, their investigations will undoubtedly clear up much of the diversity of opinion regarding the causes of the injurious effects when found and establish a basis for further investigations, leading to a complete control or elimination of this toxic substance. This conclusion seems to find confirmation in the fact that cottonseed poisoning is less feared in Texas and the Southwest than it is in the Gulf and Atlantic States, where the oil content is higher and a correspondingly high gossypol content was found.

Dr. Schwartze expressed the belief that a process of treatment or manufacture might be found to completely detoxify cottonseed meals. It should be said that all investigators working upon this project have experimented with cottonseed kernels, and that no one has so far ever been able to extract gossypol from cottonseed meal. It is known of course that the toxicity of cottonseed meal is much less than that of the seed or kernels. This is explained by the theory that gossypol is oxidized to a less toxic form during the cooking process and exists in the meal as a sparingly soluble compound designated as D-gossypol. Dr. D. B. Jones, of the Protein Investigation Laboratory, outlined his studies on the proteins of cottonseed meal.

The principal protein of cottonseed meal is known as globulin, and was separated from several samples of commercial meal. Digestion experiments *in vacuo* were conducted upon the separated globulin in comparison with the animal protein casein which is regarded as the standard of measure in digestive experiments, and it was found that with pepsin and trypsin the protein of cottonseed meal gave fully as high a percentage of digestion as did casein, corresponding to practically 100% digestibility. Dr. Jones concludes that the proteins of cottonseed meal are comparable to meat proteins, and suggests the possibility of the development of a suitable meat substitute. Further studies have been made of the effect of the addition of gossypol upon the digestibility of globulin and casein *in vacuo*, and it was found in both instances the addition of gossypol greatly reduced the digestibility of the protein.

In the case of globulin it was found to be 83% digestible, which corresponds to the average of digestive experiments on the proteins of cottonseed meal *in vivo*.

Dr. Geo. S. Jamieson, Oil, Fat and Wax Laboratory, outlined his investigations upon the constituents of crude cottonseed oil, having previously reported the method developed for the estimation of the amount of neutral oil in any given sample. Dr. Jamieson's investigations for the past year have been upon the settlings or non-oil constituents from crude oil in which he has found phosphatide, a plant lecithin, and a vegetable mucilage, but has been unable to obtain any evidence of the presence of a true gum. The study of their constituents is interesting from the fact that it is the non-oil constituents of crude oil which supply the emulsifying agents upon the addition of caustic soda and thereby have a very important bearing upon the losses obtained in refining. Dr. Jamieson is continuing this work and is hopeful of being able to supply a basis upon which might be developed a means of controlling and reducing refining losses.

Mr. George F. Bidwell, Cattle Food Investigation Laboratory, who for a number of years has had very close contact with the Interstate's committee on cottonseed meal standards and definitions, was present and expressed satisfaction with the present status of this question. He emphasized particularly, however, that the Industry for its own protection should concentrate effort on perfecting a more uniform product which will stand up to guarantees and stated that his department would look with favor upon some plan of certification of cottonseed meal shipments which was the subject of several articles in the October *Cotton Oil Press*. As tersely expressed by Mr. Bidwell, "41.5% cottonseed meal, plus a check for the deficiency, is not the equivalent of a guarantee of 43%."

Dr. Bidwell has developed in his laboratory a very rapid, simple and accurate method for the determination of absolute moisture in organic products, which will supply a long felt want and which will undoubtedly re-

place the present unscientific, inaccurate and unreliable method whenever the importance of the moisture content enters into the valuation of any commodity. The absence of such a reliable determination is all that has prevented the settlement of differences in protein content being made on a dry basis. The committee visited Dr. Bidwell's laboratory on Tuesday morning and witnessed a demonstration of this method.

Dr. Marion Dorsett, Chief, Biochemical Division of the Bureau of Animal Industry, received the committee very cordially, and outlined a policy of the fullest coöperation in keeping with the limitations of the Bureau, which relates to animal products and their bearing upon other products having a kindred nature and use. The subject of interest to this committee under investigation in this Bureau is the problem of rancidity in fats and their physiological effects.

Mr. William C. Powick was invited before the committee and outlined the work he has been engaged in for the past year. This included the study of the products formed during the development of rancidity, together with the correlated investigations of the effect of air, light and metals upon the development of rancidity. The identity of the compounds developed in rancid fats have been quite clearly defined, and at the present time the work under Mr. Powick is confined to a study of the physiological effect of rancid fats upon animals—white rats being used for the experiments. Mr. Powick has so far been able to observe that the rats fed upon the rancid fats are not thriving so well as those fed upon sweet, wholesome fat of the same origin. A rather peculiar and interesting contradiction has developed in these investigations, namely, Dr. Steimetz has recently published the result of investigations proving that freshly refined cotton oils are lacking in A-vitamines, which deficiency is readily supplied by exposure of the oil to light. As light is known to produce rancidity in fats and oils, this inconsistency regarding its nutritive value is yet to be reconciled. In this connection, Dr. Jamieson has recently made some interesting experiments consisting of the exposure of photographic plates in a dark room to the influence of refined cotton oil which had previously been exposed to light, in comparison with oils which had not been so exposed. In the former case a well-defined photographic impression was developed, while the unexposed oil produced no effect. This might seem to indicate that light exposed oils have some property of radio-activity.

Mr. Robert Kerr, Meat Inspection Laboratory, and Messrs. George E. Holm and George R. Grunback of the Bureau of Dairying, have made extensive studies of the subject of rancidity, but the time limitations of the committee prevented a review of their work.

Dr. W. W. Stockberger, Chief, Bureau of Plant Industry, has been temporarily detached from the Bureau of Plant Industry, and Mr. A. F. Sievers, who for the past year has been engaged in the analysis of cotton-

seed of different varieties from a number of locations, in coöperation with the Office of Crop Acclimatization, is temporarily on assignment to California. This problem is the development of varieties of cottonseed which will yield fiber of the maximum value, together with the maximum percentage of oil, and the effect of cultural conditions. While the results, so far tabulated, are insufficient for definite conclusions, they strongly indicate that if the work is extended through a number of years it will be possible to establish some definite facts regarding the relationship of seed values to varieties, and to general cultural conditions. Dr. Stockberger personally assured the writer that the work would be continued along even more extended lines during the present season. The writer again offered the gratuitous service of the firm of which he is a member, in handling some of the analytical determinations, as was done on all the samples (about 250) examined last year. At 12.30 P.M. the committee repaired to the Cosmos Club, where it had invited to luncheon those men in the Department who had been interested in, and actively engaged on, the program of research.

Those present besides the members of the committee, were: Dr. C. A. Browne, Chief, Mr. D. B. Jones, Mr. George S. Jamieson, Mr. George F. Bidwell, of the Bureau of Chemistry; Dr. Marion Dorsett, Mr. George E. Holm, Mr. William C. Powick, Mr. George R. Grunback, of the Bureau of Animal Industry; and Dr. W. W. Stockberger, of the Bureau of Plant Industry.

This luncheon, which was strictly informal, afforded a most favorable opportunity for a closer personal contact and an informal discussion of many phases of the work, and was thoroughly enjoyed by all.

The committee was unanimous in its opinion that this meeting in Washington, the first since 1921, was exceedingly profitable and valuable. On the other hand, the scientists engaged in the research investigations, looked upon the visit of the committee as affording them new inspiration and incentive in their work. Much valuable work has already been accomplished, and much is under way, or projected. The disposition of the Department is to coöperate with our Industry to the extent of its limitations. It remains for the Industry to direct and utilize these powerful allies to its best advantage. The committee is unanimously and firmly of the opinion that such conference as has just been held should be held at least once a year, and it is hopeful that the Interstate Cottonseed Crushers' Association, through its officers, will recognize the value and importance of this work to the extent of insisting that the close contact already established be maintained.

BARROW-AGEE LABORATORIES,
MEMPHIS, TENN.

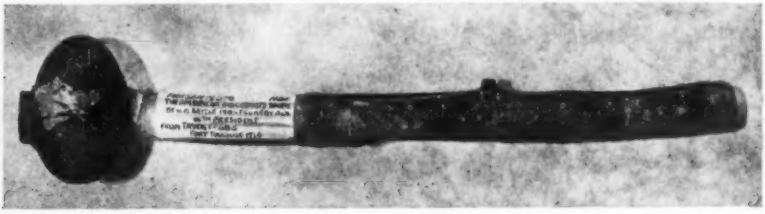
PRESENTATION OF A GAVEL AT THE 15th ANNUAL BANQUET OF THE A. O. C. S.

New Orleans, May 6, 1924

By H. B. Battle, 14th President

I have heard it said in days gone by that "uneasy lies the head that wears the crown." There must be something behind these words, or else they could not have gotten so well impressed upon the minds of so many people. There can be different kinds of crowns, worn by Czar, Kaiser, King or Kaliph. During recent years all three of these KKK's have been toppling over, and a Czar or so in addition. The crown is lost, the throne torn down, and the ruler himself dethroned, banished, or killed in cold blood, as the fury of his people may dictate.

When thinking on these things I am most forcibly reminded that a little elevation, as well as a great deal, may bring distressing responsibilities, and in fact they came to me just a year ago. Tonight it is with a feeling



of relief that I pass to my successor such authority as I have had during the past 12 months together with its emoluments.....We have this afternoon elected a new President. We have in the past tried him out on various committees, and he has shown himself both willing and able. We have placed other duties on his shoulders and still he has proven himself ready for anything that we wished upon him. It would seem that our President should have some badge of office, some symbol of his Authority. If it cannot be a sceptre, a crown or an axe, we should give him something pertaining to the industry in which we work, and upon which our Society is founded.

You may not have thought of the great antiquity of this industry. It is rooted in the dim distant past, so remote that we do not know its origin. Also it is an American industry and existed ages before Europeans came to these shores.....The aborigines, far earlier than the Indian inhabitants the white people found here, knew the value of oils and fats, and systematically manufactured them into edible products. The First Explorers found them separating oils from native nuts, which early became a recognized product for export.....The wily buyers of these products secured for a few beads or bullets or a colored cloth, sufficient

oil to more than shame their inner conscience, if indeed they possessed any. The tanks used in those days were not exactly ISTX, ATL or SCOX, but skins of animals, appropriately tied at the corners. Lacking our steel highways, over mountains and through dales, the transfer of these oils from the interior to the coast required weeks of rough mule back jolting over almost impassable trails in all kinds of weather. I honestly believe the flavor of the oil was somewhat affected, and the free fatty acid and the refining loss must have been increased by such treatment. Their "flag settlements" in consequence must have carried disaster to the poor native sellers.

Investigations have shown us that native nuts, such as walnuts and hickory nuts and even acorns, were very extensively used in this oil manufacture. Not having a hydraulic press, the natives were perforce obliged to extract the oil in other ways. This they did by boiling the cracked nuts in water and skimming off the oil, which came to the top. The badge of office to be transferred to our new President, Mr. Morrison, is in fitting commemoration of these ancient oil crushers. The gavel which I hand to him is a product of these aborigines. The children were taught to crush the nuts, and a hammerstone was used similar to the one upon this gavel, only oftentimes of a larger size. The handle of the gavel is from the wood of a black walnut tree now growing on the ancient site of Taskigi-town, a settlement of the Upper Creek nation within a very few miles of Montgomery, Alabama. This tree was either planted by the Indians or else is a seedling from one which was, because the trees are growing in a straight line near the town site.....Fort Toulouse was located there by the French in 1714 and remained under them until the treaty of 1760, when they withdrew their outposts and left the country in the hands of the English.....

Indian chieftains, many of national fame, such as Osceola and Tecumseh, had their origin very close to this exact spot, for in fact in earlier days this region was the most populous in native inhabitants in all the broad country. We can but hope that the liquid golden oil which these primal people transmuted from native growth, and which supported them in their lives, and formed the basis of an important industry, may also continue to increase and multiply in this land of ours, and bring joy, happiness and prosperity in excess of that of the present or recent years. The aboriginal Americans were our first chemists and oil crushers, and I take pleasure in passing on to our newly elected President, this symbol which reminds us of them, and in fact was a part of their daily life.

I bespeak for our new President your close coöperation and assistance in making his administration the very best we have ever had.....

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ABSTRACT

A paper by Wilmer C. Powick of the Bureau of Animal Industry, entitled "The Characteristics of Rancid Fat as a Food," was presented. Complete rations containing rancid lard were fed to white rats, in comparison with similar control rations containing equal quantities of sweet lard. In two experiments the ration constituents were combined in a single mixture, while in a third experiment, the Vitamin A in the form of dried egg yolk was fed apart from the main ration. Post mortem examinations showed no evidence of rancid lard being toxic to white rats; but where the Vitamin A was incorporated in the same mixture with the rancid lard, vitamin deficiency resulted in all cases. This did not happen when sweet fat was employed or when the Vitamin A was fed separately. The food consumption data indicated that the observed deficiency was not due to insufficient food intake. Apparently the Vitamin A was gradually destroyed through intimate contact with the rancid lard, presumably being oxidized by the organic peroxides that are characteristic of rancid fats in general.

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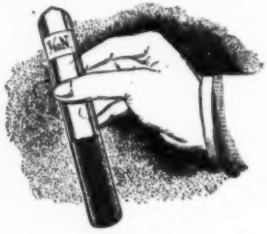

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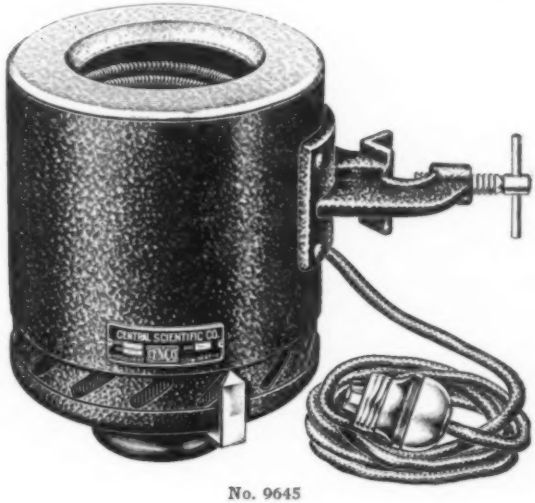

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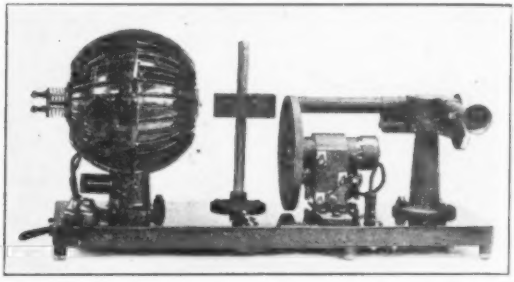

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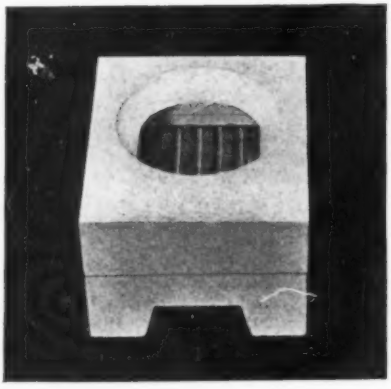

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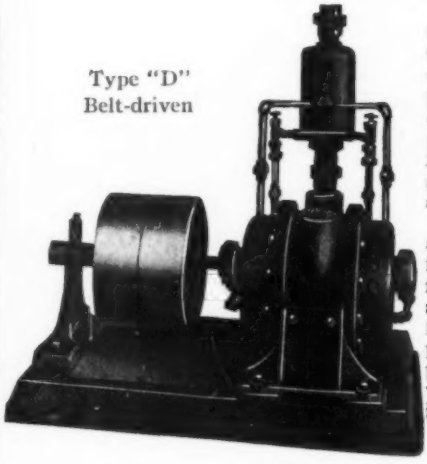

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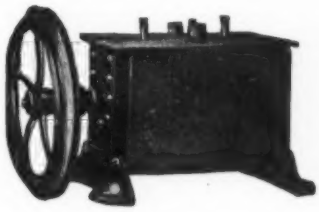

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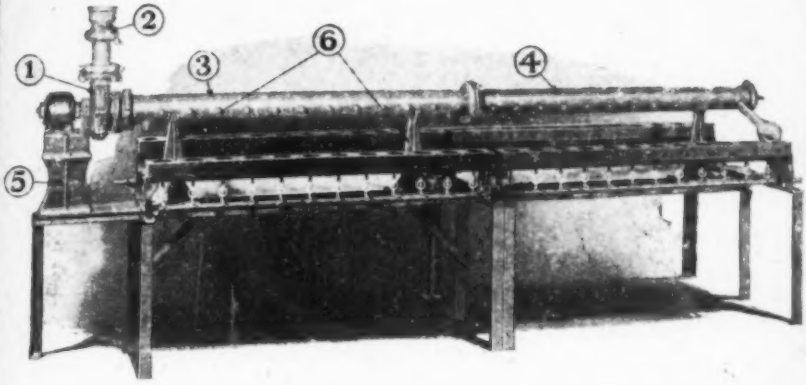

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